Comments of Jim Lazar, Consulting Economist
Utility Rate Design Concept Paper
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Introduction

Jim Lazar is a consulting economist with more than three decades of experience examining utility rate and resource planning issues. In addition to maintaining an independent consulting practice, he is an Associate with the Regulatory Assistance Project (RAP), which assists utility regulators throughout the world. He has assisted RAP with domestic projects, and with international utility regulatory trainings in India, China, Indonesia, the Philippines, Brazil, Mozambique, and Namibia. RAP has participated in several previous HPUC activities over the past decade, represented by Richard Sedano, Richard Cowart, and Cheryl Harrington.

His involvement in Hawaii utility regulation began in 1990, when he taught a multi-day, multi-island seminar on Integrated Resource Planning. Since that time he has consulted for the Hawaii Consumer Advocate, for the Research Corporation of the University of Hawaii, for Hawaiian Electric Company, and for the County of Maui. These comments draw significantly on the information provided previously in *Hawaii Energy Utility Regulation and Taxation*, (Hawaii Regulation) the report to which Mr. Lazar was a co-author, submitted by J. Carl Freedman of Haiku Design to the Hawaii Energy Forum in 2003.

These comments bring forward his experiences in both domestic and international utility regulation, together with his extensive understanding of the Hawaii utilities, to recommend means to comply with the legislative direction, protect the public interest, and encourage the development of cost-effective renewable energy resources and energy efficiency measures.

Renewable Portfolio Standards Generally

About half of the United States, several Canadian provinces, and numerous other countries have implemented one form or another of renewable portfolio standard (RPS). Some have considered a broader "energy portfolio standard" to include energy efficiency, while most others separated renewable resource mandates from efficiency incentives. The state of Colorado recently adopted an RPS by vote of the public.

First and foremost, if an RPS requires more rapid deployment of specified resources than general load growth, the RPS resources will force underutilization of existing resources. On the mainland, where the conventional resources have low running costs, this can create significant rate pressure. In Hawaii, where the majority of generation is oil-fired, high variable costs probably mean that “overshooting” the new resource requirement will not create rate pressure.

Many states have effectively addressed incentives for renewable resources, either in conjunction with or independent of any form of RPS. More than two decades ago, the state of Washington dictated a higher equity return on energy efficiency investments than for general utility plant. Several states have provided for more timely recovery of renewable resources costs, through single-issue rate proceedings and/or power cost adjustment mechanisms, even though comparable treatment may not exist for conventional resources.

Hawaii’s legislation is unusual, in that it defines “renewable resource” to include energy efficiency. This presumably put three kinds of resources on equal footing for aggressive development: generating renewable resources, such as wind turbines, direct-application renewable resources such as solar water heaters, and the myriad of energy efficiency measures that are available to and cost-effective for Hawaii citizens.

Preventing Lost Opportunities

A “lost opportunity” is an energye efficiency or renewable energy opportunity that may be cost-effective at the time of new building construction or major remodeling, but would not be cost-effective on a retrofit basis. Examples include:

- Installation of a solar water heater in a new residence
- Construction of a CHP system for a resort hotel
- Development of a district cooling system for a new office or retail complex.
- Installation of an energy storage system to take advantage of Time-Of-Use rates.

One important focus of any regulatory reform should be to prevent “lost opportunities” from denying the public economic benefits that are available from energy efficiency and renewable resources. These benefits include, but are not limited to:

- Increased reliability of service
- Decreased total cost of meeting energy end-use requirements
- Reduced reliance on imported fuel
- Local economic development: increased reliance on technologies with high local labor content
- Tax benefits from avoidance of utility add-on taxes, particularly federal income tax
- Lower costs due to lower mortgage interest rates relative to utility rates of return, when RPS incentives lead to inclusion of efficiency and/or solar water heating in residential structures
- Tourism benefits (people like to visit innovative locations)

Preventing lost opportunities requires that methods be in place to ensure that the decision-maker for a new or remodeled facility sees all of the costs that the society will incur as a result of their decision. If new electric resources cost more than existing resources (as is the case in Maui), then hook-up fees (or load-avoidance credits) can assist. If environmental costs such as carbon dioxide emissions are not included in utility rates, then an offsetting mechanism is needed to communicate this social cost. If particular locations have higher distribution system avoidable costs, some means to provide an appropriate price to developers is needed in such locations.

Lost opportunities can be addressed through either incentive mechanisms (rewards or grants to developers and builders for doing the right thing) or through pricing (charges that reflect societal costs) to these new and expanding customers. From the perspective of existing customers, rewards cause upward rate pressure, while pricing options constrain future utility rates.

In many cases, the simple provision of design assistance to builders, architects, and engineers may result in improved building design and equipment specification. However, it is more likely that direct financial incentives (or penalties) will be more effective. Studies by DBEDT and others have indicated that new structures in Hawaii could be 20% - 50% more energy efficient with the application of available technology. Achieving this efficiency should be a principal goal of the PBR effort.

Paragraph 21: Hawaii-Specific Locational Issues

As with most areas of culture and commerce, Hawaii is "different." First, the fact that the electric utilities serving different islanes are not interconnected means that there is no realistic prospect of a competitive wholesale power market forming on the neighbor islands, and relatively little prospect on Oahu. The dependence on oil is important for Hawaii, but is also present in Alaska, Guam, Puerto Rico, and certain other remote areas of the United States. The loads in Hawaii are very different, with minimal heating requirements, low cooling requirements, abundant direct solar opportunities, and abundant combined heat-and-power (CHP) opportunities, particularly in the resort hotel sector. CHP is not technically a "renewable" resource, but the statutory definition to include energy efficiency means that CHP can and should be considered in meeting the RPS standard.

Hawaii has a very generous fuel adjustment mechanism. Many states have eliminated fuel and purchased power adjustment mechanisms, or converted them to partial cost-recovery mechanisms with well-defined sharing mechanisms. The generosity of this mechanism tends to bias Hawaii utilities in favor of resources with low capital costs and high fuel costs, because the fixed costs are "at risk" while the variable cost recovery is largely protected. This is precisely the wrong incentive if renewable resources are a goal, as these resources have the opposite cost profile. In addition, the current mechanism has perverse incentives for utilities to run high-cost plants (though there is no evidence that they have responded to this incentive, as explained in detail in <u>Hawaii Regulation.</u> At a minimum, the Commission should launch a generic investigation of the form and structure of the fuel adjustment mechanism to remove the existing adverse bias in favor of high-cost (diesel) generation, and to provide equitable treatment for renewable resources and energy efficiency, relative to oil-fired generation..

The alternatives for renewable energy in Hawaii are legion. These include direct renewable resources, primarily solar water heating, but possibly also solar cooling. They include central station renewable generation such as wind and geothermal, and emerging solar technologies. The inclusion of energy efficiency in the portfolio standard opens a myriad of opportunities, ranging from new building design and construction methods to retrofit. Finally, fuel substitution is a form of energy efficiency if the end-use efficiencies are improved.

The last of these merits special consideration by the Commission. Relatively few regulatory bodies have embraced fuel choice programs, but Hawaii is an obvious candidate for the due to the high dependence on oil-fired generation. I recommend that the Commission consider fuel choice programs for applicable end-uses, particularly water heating.

While the locational cost for renewable energy in Hawaii are comparatively high, this is driven by the size and remoteness of the island economies, and these same factors affect the cost of conventional generation. While new combined-cycle generators on the mainland are routinely developed for less than $700/kw, in Hawaii costs of as much as $2,500/kw are projected (for MECO). This tends to create a playing field for renewable resources in Hawaii that is equal to – or perhaps better than – many places on the mainland. For example, while the cost of installing a solar water heater is higher in Hawaii, the size of water heater needed is smaller, due to the higher inlet water temperature. Coupled with the high cost of conventional resources, this makes the economics of solar water heat quite compelling in Hawaii. Increasing the penetration of solar water heating should be a principal objective of the RPS compliance process. This means putting in place incentives to ensure that new buildings are not constructed without full consideration of solar water heating opportunities. I will separately discuss “lost opportunities” and include specific approaches to achieve measures that may become uneconomic if not pursued at key points in the energy decisionmaking process.

Successful RPS Schemes: There are very successful RPS schemes in place in many states. Examples include from California, where a state policy gives priority to renewable resources in the Long-Term Procurement regulatory review process, and Nevada, where separate competitive solicitations for renewable resource procurement is required. In Washington, a recent wind-only resource procurement process was completed by Puget Sound Energy, but this was not in response to a legislative mandate – the utility’s own Least Cost Plan identified wind as a least-cost resource with desirable cost and risk stabilization benefits.

Rate Design to Encourage Efficiency and Renewables: Principal elements of rate design to encourage consumer-reliance on efficiency and renewables include the following:

- Inverted end-block pricing for residential customers, has the effect of making solar water heating more economically attractive, while preserving limited low-cost existing resources to meet essential needs. End-block loads tend to be more concentrated during peak periods (i.e., lower load-factor), more seasonal, and more discretionary. There are solid cost-based reasons for implementing inverted rates in Hawaii. This form of rate design has contributed to dramatic (as much as 40%) reductions in use per customer on utility systems in the Pacific Northwest, particularly Puget Sound Energy and Seattle City Light. The reduction comes from a combination of fuel switching and end-use efficiency investment, both of which comply with the efficiency option under the Hawaii RPS legislation. By reducing loads, they mean that existing renewable resources will be a larger percentage of the total utility load, also helping to comply with the RPS legislation. In Hawaii, it is likely that inverted rates will also encourage investment in on-site renewable resources for customers able to avoid end-block power purchases..

- Vintage rates for all customers, providing a (higher) marginal-cost based rate for all new loads. This can ensure that new customers and existing customers with expanding loads see the cost of new generating resources in prices, giving them an incentive to invest in on-site renewable resources, CHP, and energy efficiency.

- Hook-up fees for new and expanding loads, that create a level playing field between the high initial cost of new electric generation facilities and the high initial cost of efficiency and on-site renewable resource development. This approach is before the Commission in the current DG docket. This analysis could be modeled by comparing the effect on total energy revenue requirements (utility and non-utility) that would be achieved if all new and remodeled buildings were 30% more energy efficient than is current practice. Since the hook-up charges themselves are revenue-neutral (charges to one customer meet a portion of the utility revenue requirement, which then is NOT charged to another), this modeling assumption is relatively easy to examine. The hook-up charge simply puts the builder and the society on a level playing field – examining alternatives in direct comparison to each other.

- Rolling baseline rates for commercial and industrial customers, pricing 50% - 80% of historical power usage at a cost-based rate reflecting older resources, and incremental usage at the cost of power from newer, higher-cost resources. Long used in the natural gas area (called excess base-year rates or imposed as part of pipeline open seasons), British Columbia is implementing this approach for all commercial and industrial electric customers to preserve the existing low-cost power resource to meet less elastic power needs.

- Converting the existing load-factor blocks for Schedules J and P to true time-of-use blocks. These may tend to stimulate investment in on-site solar and energy efficiency opportunities (including thermal storage) which can reduce consumption during priority peak periods.

The Commission should, at a minimum, consider inverted residential rates, TOU rates for Schedule P, and hook-up fees as rate design approaches to explore for the RPS analytical work. I recommend the following explicit modeling assumptions:

Inverted Residential Rates: A 30% reduction in rates for usage below 300 kWh, offset by an offsetting increase (approximately 20%) in rates for usage over 300 kWh.

TOU Rate for Schedule P: Convert the three load factor blocks into Priority Peak, Shoulder Peak, and Off-Peak rate blocks; I estimate that a 30% increase to the first block rate (and corresponding reduction in on-peak load) would be required to make this revenue neutral, given the fact that there are only about 100 priority-peak hours, compared with 200 hours in the initial load factor block. To the extent that this results in lower on-peak usage, offset by higher off-peak usage, fuel savings from increased reliance on combined-cycle generation (avoidance of simple-cycle peakers) should provide a measure of the efficiency benefit. To the extent that these increase reliance on renewable technologies such as solar water heat, the analysis should provide a measure of the renewable resource increase.

Hook-up Charges: In the DG docket, my testimony recommends a cost-based connection fee for MECO customers, based on the difference between the cost of new generation facilities (about $3,000/kW) and the average cost of existing facilities (about $1,000/kW). The same concept could be applied to the other islands (with island-specific costs), or else a single island could be modeled. The modeling results should indicate a significant shift by builders to more energy efficient technologies, substitution of on-site renewable resources, and installation of on-site CHP systems, all of which comply with the legislative direction.

Alternative Regulatory Schemes (Paragraph 29)

RAP has been involved in the implementation of PBR schemes both domestically and abroad. Much of our thinking on PBR is explained in the RAP publication *Performance Based Regulation for Distribution Utilities* (December 2000) available on our website at www.raponline.org.

The most important objectives of PBR should be:

- Reduce the cost of energy end-use to consumers.
- Protect the reliability and quality of service.
- Provide rewards to utilities that are efficient, while penalizing those that are not.

We believe that these goals can be achieved if and only if a PBR mechanism includes specific provisions for customer service quality assurance. Examples of failed PBR mechanisms, primarily rate caps and stay-outs, are replete with utilities cutting maintenance, cutting customer service staffs, reducing emergency and outage response capabilities, and other cost-cutting measures that reduce the quality of service. A Service Quality Index (SQI) is an essential element of any PBR mechanism. We can supply examples of SQI mechanisms for consideration by the Commission.

Among the traditional PBR mechanisms, we believe that the "revenue cap" or "decoupling mechanism" is the preferred form of regulation to encourage utility support for renewable resources and efficiency. This approach sets the utility's total revenue per customer (or distribution revenue per customer, in some cases) to a defined level. If usage declines, the utility is made whole. If usage increases, the incremental net revenue is rebated to consumers. The California ERAM, and Washington PRAM mechanisms were of this form. The simple formula for a Revenue Per Customer (RPC) revenue cap mechanism is:

Revenue per customer in year 1 =

Cost of service at time of rate case / customer count

Revenue per customer in years 2 - n =

Revenue per customer in year 1 + inflation - productivity adjustment

If customer growth occurs, it is reasonable to assume that distribution investment growth, power supply investment growth, and labor needs will increase. The RPC allows utility revenue to grow with new business, but not with expanded sales to existing customers.

The RPC mechanism may need fine tuning if the typical "new" customer has significantly different usage or locational cost characteristics that existing customers.

We recommend that the Commission explore an RPC form of PBR for Hawaii.

We recommend that rate caps (as opposed to revenue caps) be explicitly rejected, because the create an incentive for increased utility sales whenever short-run marginal costs are lower than rates. This creates an incentive that is directly contrary to the goal of the RPS legislation with respect to encouraging energy efficiency and the use of direct application renewable resources such as solar water heat.

We also recommend above that the Commission undertake a complete review of the fuel adjustment mechanism, to increase incentives for economic efficiency in the choice of generating facility dispatch discussed in *Hawaii Regulation*, and to reduce the existing incentive for increased sales. As one of the very first RAP publications (Profits and Progress Through Least Cost Planning, 1990) pointed out, a fully-reconciled fuel clause makes EVERY increased kilowatt-hour sold a profitable action, and EVERY reduction in sales a burden on the net income of the utility. This needs to be reversed, while recognizing that the financial exposure of Hawaii utilities to fuel costs is very significant, and the price of that fuel is largely ouside their control.

Simulation Modeling (Paragraphs 40, 46, and 53)

In Docket 7310, the author undertook extensive hourly simulation modeling of the Hawaii utilities in order to determine what the contribution of as-available resources (such as wind) was to the reliability of electric service. We learned from that exercise that wind resources deserve a “firm capacity” credit roughly equal to their annual capacity factor. We consider this type of analysis to be the primary benefit that hourly modeling will bring for Hawaii.

The Consumer Advocate made a significant investment in software, training, and configuration in order to explore this and other system dispatch issues. That investment has languished for many years.

On the mainland, where utilities are interconnected to large grids, and are typically either buyers or sellers in the market at all hours, there is greater benefit to be gained from hourly simulations. Such studies can identify maintenance schedule changes, transmission link investment opportunities, dispatch opportunities, and other cost-containment options. In Hawaii, the opportunities are much more limited, and we do not think that a huge investment in hourly modeling is necessarily appropriate. We look forward to other’s views on this.

Some elements that should be examined if hourly modeling is prepared include:

- Contribution of as-available resources such as wind to loss of load hours (LOLH) or loss of load probability (LOLP) on the utility systems, and the value of any appropriate capacity credit for these as-available resources. This requires that the models be able to measure LOLP or LOLH.

- Contribution of on-site solar resources to peak load reduction, and therefore to improved reliability and/or peaking power plant deferral or economic dispatch. This would require hourly estimates of solar contribution to load reduction.

- Relative value of solar, wind, and geothermal resources based on the hourly contribution to meeting load of each type of resource. This requires only calculation of capacity credits for each, and system lambdas for the hourly profile of each type of resource.

- Measure the capacity deferral and load shape impacts of expected load reductions if the rate design schemes discussed above, including inverted rates, vintage rates, hook-up fees, and rolling baseline rates.

Incentives and Penalties (Paragraph 53)

Utility incentives and penalties under PBR should be balanced. The objective should be to give the utility a strong incentive to encourage and participate in cost-minimizing actions that achieve the legislative goal, and to penalize actions that detract from achievement of the objectives.

The creation of an RPC decoupling mechanism will only eliminate incentives to promoting throughput, and provide incentives to minimize the cost of serving customer needs. It levels the playing field with respect to sales incentives, but not for other purposes. It will not necessarily bias the utilities in favor of renewable resources or efficiency resources. Explicit incentives for meeting RPS goals, and/or penalties for failure to meet them, are also important tools.

An RPC or other decoupling mechanism is a risk reducing tool for utility investors, since it shifts the risk of load variation and attendant earnings volatility to consumers. Regulators have recognized that risk reducing mechanisms should be coupled with reductions in the cost of capital, either by reducing the allowed return on common equity, reducing the equity capitalization ratio, or both. Standard and Poors recently adopted "Business Profile" indicators for most utilities in the country, assigning the lowest risk (and the lowest required equity capitalization ratios) to those with protection from sales volatility and fuel costs – primarily natural gas utilities with fully-reconciled PGA mechanisms and electric utilities operating in restructured jurisdictions with distribution utilities entirely removed from generation risk.

As we discussed above, however, an SQI is also essential under any PBR scheme, since utility efforts to constrain costs (under RPC, Rate Caps, or conventional cost-of-service regulation) can lead to reliability and quality impairment. The 10-measure SQI in place for Puget Sound Energy, with annual reporting to the Commission and to consmers, and an annual penalty of up to 1/2% of gross revenue, is proving sufficient to induce improved performance by the utility.

The Nevada Commission has demonstrated the magnitude of incentive that can produce desired results. Nevada Power and Sierra Pacific Power suffered disallowances of $400+ million from imprudent fuel and purchased power decisions in 2000-2001. These penalties resulted in a complete suspension of utility dividends for Sierra Pacific Resources. Since this disallowance, not only SRP, but also many other utilities have adopted and implemented more aggressive portfolio management tools for purchased power and fuel. The Nevada Commission has also recently approved significant renewable resource purchase contracts for these same utilities, with prompt consideration, prompt resolution, and fair treatment for the utility. As a result, these utilities have substituted renewable resources for an increasing percentage of their loads – consistent with RPS principles. Doing so avoids the risk of fuel cost disallowance. It is likely that a demonstrated risk of fuel cost disallowance would have a similar effect on Hawaii utilities.

Failure to meet the RPS goal should result in financial penalties to the utility on the order of 2% of their equity return. Similarly, the bonuses for achieving the RPS goals and achieving cost reductions to consumers at the same time should allow for an incentive of approximately the same amount. This is the incentive level adopted by the Washington legislature in 1980 for efficiency investments, and that proved adequate as an incentive (although there were other flaws in that particular mechanism). For example, a utility with a 10% allowed return on equity should be allowed to earn up to 12%, or as little as 8% as a result of operation of the incentive/penalty mechanism. Additional deviation could result from weather or economic cycle variations or other matters, although many decoupling mechanisms shift much of this risk from the utility to the consumer.

Any penalty or reward should be evaluated annually, and put in place for at least a year. This type of mechanism is essential to provide utilities with some certainty that rewards will be enduring for long enough to produce a meaningful addition to earnings. Similarly, utilities must fear that penalties will be swift, sure, and severe in order to induce desired behavior.

Summary Recommendations (Paragraph 58)

We summarize our discussion above with the following specific recommendations:

1) The Commission should launch a generic investigation of the form and structure of the fuel adjustment mechanism.

2) Increasing the penetration of solar water heating should be a principal objective of the RPS compliance process. Measures which do not achieve this

3) Examine rate design options, including:

- Inverted residential rates
- Vintage Pricing
- Rolling Baseline Pricing
- Hook-up fees

4) Establish a Customer Service Quality Index with penalties for inadequate performance on any measure in conjunction with any PBR.

5) Evaluate a Revenue Per Customer form of decoupling for Hawaii utilities.

6) Measure the capacity value of as-available generation using hourly simulation models to measure the impact on LOLH and/or LOLP.

7) Measure the relative value of solar, wind, and geothermal resources based on the hourly output profiles of each type of resource, the capacity value of each type of resource in reducing LOLH and LOLP, and the system variable cost for each load profile.

8) Establish an incentive/penalty mechanism for compliance with RPS goals that creates a 2% potential reduction or increase in the return on common equity for utilities.

9) Recognize that any form of PBR that includes decoupling will reduce the cost of capital for utilities, and measure the impact of alternative. The shift of risk from investors to consumers should not go uncompensated.

10) Target measures that will reduce the risk of lost opportunities from being developed. This means that new construction and major reconstruction of buildings should be a principal target of revised regulatory attention.

I appreciate the opportunity to participate in this discussion, and look forward to being involved in the process as it unfolds over the coming months.